REMARKS

Claims 31, 49, 61, 63 and 64 have been amended. Claim 66 is new. Support for the new and amended claims can be found throughout the specification, for example, at page 9, lines 11-15, page 8, lines 29-31, in claims 39, 45 and 46, and in claim 35, which has been canceled. No new subject matter has been added.

Claims 31, 34, 36-49, 52 and 54-66 are pending.

Claims 31, 34, 37-41, 44-47, 49, 52-55 and 58-65 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fuerschbach (U.S. 4,815,534) in view of Usui (U.S. 4,223,826) and Mizuhara (U.S. 4,497,772). Applicant submits that claim 31, as amended, is allowable for at least the following reasons.

Claim 31, as amended, recites a plate heat exchanger with plates of stainless steel containing chromium. The heat exchanger has one or more port channels and one or more connection surfaces for later connecting the port channels to a pipe member. The one or more connection surfaces are formed with a nickel-based material having a thickness between about 20 and 50 μm. The material is bound to the stainless steel through diffusion of atoms from the material into the stainless steel and from the stainless steel into the material and has a melting temperature such that the material does not melt when it is later connected to the pipe member.

Thus, claim 31 now emphasizes that the nickel-based material forms a connection surface for a later connection (e.g., by brazing) to a pipe member. In other words, the nickel-based material is in-place before a pipe member is brazed to the connection surface.

Even if it somehow had been obvious to combine the cited references in the manner the Examiner suggested would have been obvious, which Applicants do not concede, the subject matter now recited in claim 31 would not have resulted. The Examiner indicates that "it would have been obvious . . . to make the system of Fuerschbach et al using the brazing technique of Usui" and that "the substitution of brazing alloy of Mizuhara would have been obvious." Office action, page 4. As discussed below, this combination would not have produced the claimed subject matter.

First, the "system of Fuerschbach" does not include a plate with a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. It appears that the Examiner would consider Fuerschbach's top plate 14, for example, as corresponding to the claimed "heat exchanger plates." *See* office action, page 3. Fuerschbach discloses that this top plate 14 can be either carbon or stainless steel plate stock. *See, e.g.,* col. 6, lines 17-20 and FIG. 2. Fuerschbach top plate does not have a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. The Office action does not appear to allege anything to the contrary.

Second, if one had made the Fuerschbach system "using the brazing technique of Usui," as the Examiner suggests would have been obvious, the resulting structure would not have included a plate with a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. As indicated above, the Usui patent discloses a method of brazing stainless steel to stainless steel or to another metal. Col. 1, lines 6-7. The method includes plating the surfaces to be joined with copper (Cu) and then brazing the Cu-plated surfaces together using a copper base-tin alloy brazing material. *See* col. 2, lines 30-36 and 49-53 and Abstract.

Usui's Cu-plated surface, which presumably would correspond to the claimed "connection surface" under the Examiner's view, is not a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. Thus, even if the Fuerschbach system had been made "using the brazing technique of Usui," the resulting structure would not have included a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. The Office action does not appear to allege anything to the contrary.

Third, if one had made the Fuerschbach system "using the brazing technique of Usui," but replaced Usui's copper base-tin alloy brazing material with Mizuhara's brazing alloy that includes nickel, as the Examiner suggests would have been obvious, the resulting structure still

would not have included a plate with a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. That is because, prior to brazing, the portion of the plate that presumably would correspond to the "connection surface" of claim 31 would be the Cu-plated surface; it would not include a nickel-based material, as recited in claim 31. Instead, in this combination, nickel would only be introduced during the brazing process. Therefore, it would not have been present in advance of the brazing.

Thus, even if the cited references had been combined in the manner the Examiner suggests would have been obvious, this would not have resulted in a plate with a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31.

Claim 31 should be allowable for at least the foregoing reasons.

Claim 31, as amended, also recites a plate heat exchanger with plates of stainless steel containing chromium. The heat exchanger has one or more port channels and one or more connection surfaces for later connecting the port channels to a pipe member. The one or more connection surfaces are formed with a material that does not melt when later connected to the pipe member.

The cited references, alone or in any reasonable combination, do not disclose or render obvious the claimed subject matter. More particularly, even if a person of ordinary skill somehow did attempt to combine the cited references in the manner the Examiner suggested would have been obvious, the claimed subject matter would not have resulted.

As discussed above, in the supposedly-obvious combination of the cited references, Mizuhara's nickel-containing brazing alloy would be used to connect (e.g., braze) a threaded nipple (e.g., one of the nipples IH, OH, IC, OC in Fuerschbach's patent) to a connection surface on a heat exchanger plates. Thus, in the supposedly-obvious combination, Mizuhara's nickel-containing brazing material would melt in order to form the connection between the threaded nipple and the connection surface.

Accordingly, even if a person of ordinary skill somehow did attempt to combine the cited references in the manner the Examiner suggested would have been obvious, the resulting structure would not include connection surfaces formed with a material that does not melt when later connected to a pipe member, as recited in claim 31.

Claim 31 should be allowable for the foregoing additional reasons as well.

Claim 31 also has been amended to recite that the nickel-based material that forms the connection surface prepared for a later connection of the one or more port channels to a pipe member has a thickness between about 20 and 50 μm.

The Cu-plating disclosed in Usui has a thickness of 4 μm. *See* col. 3, line 21. None of the other cited references disclose or provide a reason why a person of ordinary skill would have formed a connection surface with a nickel-based material having a thickness between about 20 and 50 μm, as now recited in claim 31.

Claim 31 should be allowable for the foregoing additional reasons as well.

Claims 34, 37-41 and 44-47 depend from claim 31 and, therefore, should be allowable for at least the same reasons as claim 31.

Independent claims 49 and 61 recite subject matter that is similar to the subject matter of claim 31.

Claim 49, for example, now recites a method for manufacturing a plate heat exchanger including a number of heat exchanger plates, which are substantially manufactured in stainless steel containing chromium, wherein one or more of the port channels are surrounded by a connection surface prepared for a later connection of the port channel to a pipe member. The method includes applying a material, which forms the connection surface, wherein the material is based on nickel and has a thickness between about 20 and 50 μm. The material has a melting temperature such that the material does not melt when later connected to the pipe member.

As discussed above, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination, do not disclose or render obvious the claimed subject matter.

Claims 49 and 61 should be allowable for at least the foregoing reasons.

Claims 52-55 and 58-62 depend from either claim 49 or 61 and should be allowable for at least the same reasons as the claims from which they depend.

Claim 63, as amended, recites a plate heat exchanger with a number of heat exchanger plates, wherein the heat exchanger plates comprising stainless steel containing chromium. The plate heat exchanger includes a number of port channels extending through at least some of the heat exchanger plates. One or more of the port channels is surrounded by a connection surface for a later connection of the one or more port channels to a pipe member. The connection surface includes a material with a melting temperature such that the material does not melt during the later connection to the pipe member.

As discussed above with regard to claim 31, the cited references, alone or in combination, do not disclose or render obvious the claimed subject matter.

Claim 63 should be allowable for at least the foregoing

Claim 63, as amended, also recites that the material that forms the connection surface comprises an alloy with 55 to 95 percent copper by weight and 5 to 45 percent nickel by weight.

None of the cited references discloses or renders obvious a connection surface that includes an alloy with the recited percentages of elements.

Claim 63 should be allowable for at least the foregoing additional reasons.

Claims 64, as amended, recites a plate heat exchanger that includes heat exchanger plates arranged beside one another and connected together by one or more braze connections, wherein the heat exchanger plates include stainless steel containing chromium. One or more port channels extend through at least some of the heat exchanger plates. One or more connection

surfaces are provided for a subsequent brazing of one or more of the port channels to one or more respective pipe members. The connection surface includes a nickel-based material that is adapted such that it will not melt when the one or more port channels are subsequently brazed to the one or more respective pipe members.

For at least the reasons discussed above with respect to claim 31, the cited references do not disclose or render obvious the claimed subject matter.

Claim 65 depends from claim 64 and, therefore, should be allowable for at least the same reasons as claim 64.

Claims 35 and 36 were rejected under 35 U.S.C. §103(a) as unpatentable over Fuerschbach, in view of Usui and Mizuhara and further in view of Wells (U.S. 3,675,311).

Claims 35 and 36 depend from claim 31, which recites heat exchanger plates that are substantially manufactured in stainless steel containing chromium. A number of port channels extend through at least some of the heat exchanger plates. One or more of the port channels are surrounded by a connection surface prepared for a later connection of the one or more port channels to a pipe member. The connection surface is formed by a material based on nickel and having a thickness between about 20 and 50 μm. The material has a melting temperature such that the material does not melt when later connected to the pipe member.

As discussed above with reference to claim 31, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination, do not disclose or render obvious the claimed subject matter. Nor does the Wells patent, alone or in any reasonable combination with the other references, disclose or render obvious the claimed subject matter.

The Wells patent merely discloses thin-film diffusion brazing of nickel and nickel base alloys. The techniques disclosed include producing a coated material (coated with either titanium or niobium and either silver or gold material) and placing the coated material between adjacent surfaces to be bonded. The pieces are held together at a temperature in excess of 950°C

for a time period sufficient to achieve a solid state diffusion of the material into the nickel or nickel base alloy, and diffusion of the nickel or nickel base alloy into the joint area.

The Wells patent does not relate to plate-type heat exchangers with plates that are substantially manufactured in stainless steel and containing chromium, as recited in claim 31. Indeed, the Wells patent does not even mention stainless steel or chromium. The Wells patent also does not disclose a plate with a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. The Wells patent also does not disclose a connection surface formed with a material that does not melt when later connected to a pipe member, as recited in claim 31.

Claims 35 and 36 should be allowable for at least the foregoing reasons.

Claim 56 also was rejected as being obvious over Fuerschbach in view of Usui and Mizuhara and further in view of Wells.

Claim 56 depends from claim 49, which recites subject matter similar to the subject matter of claim 31. As discussed above with reference to claim 31, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination, do not discloses or renders obvious the claimed subject matter. Nor, for the reasons discussed above with reference to claims 35 and 36, does the Wells patent, alone or in any reasonable combination with the other references, disclose or render obvious the claimed subject matter.

Claim 56 should be allowable for at least the foregoing reasons.

Claims 42 and 43 were rejected as being obvious over Fuerschbach in view of Usui and Mizuhara and further in view of an article in the Encyclopedia Britannica.

Claims 42 and 43 depend from claim 31. As discussed above, Fuerschbach, Usui and Mizuhara, alone or in combination, do not disclose or render obvious the claimed subject matter. Nor does the article from the Encyclopedia Britannica disclose or render obvious the claimed subject matter.

The article from Encyclopedia Britannica discloses, in relevant part, preparing brazing surfaces by mechanical or chemical polishing. The article does not disclose or renders obvious the subject matter of claim 31 that is missing from the other cited references. Nor does the Office action assert otherwise.

Claims 42 and 43 should be allowable for at least the foregoing reasons.

Claim 48 was rejected as being obvious over Fuerschbach, in view of Usui and Mizuhara and further in view of Blomgren (US 6,016,865).

Claim 48 depends from claim 31. As discussed above with reference to claim 31, neither Fuerschbach, Usui, nor Mizuhara, alone or in any reasonable combination, discloses or renders obvious the claimed subject matter. Nor does the Blomgren patent disclose or render obvious the claimed subject matter.

The Blomgren patent discloses a plate type heat exchanger in which a washer 15 is brazed as part of plate heat exchanger assembly. *See* col. 4, lines 4-10.

The Blomgren patent, however, does not disclose a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium, where the heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide and where the material includes nickel. The Blomgren patent also does not disclose a plate with a connection surface for later connection (e.g., by brazing) to a pipe member, where the connection surface includes a nickel-based material, as recited in claim 31. The Blomgren patent also does not disclose a connection surface formed with a material that does not melt when later connected to a pipe member, as recited in claim 31.

Claim 48 should be allowable for at least the foregoing reasons.

Claim 57 was rejected as being obvious over Fuerschbach in view of Usui in view of Mizuhara in view of Wells and further in view of an article from Encyclopedia Britannica.

Claim 57 depends from claim 49. As discussed above, neither Fuerschbach, Usui, Mizuhara, Wells, nor any combination thereof, discloses or renders obvious the subject matter of claim 49. Nor does the article from Encyclopedia Britannica, alone or in combination with the other cited references, disclose or render obvious the claimed subject matter.

As discussed above, the article from Encyclopedia Britannica discloses, in relevant part, preparing brazing surfaces by mechanical or chemical polishing. The article does not disclose or render obvious the subject matter of claim 49 that is missing from the other cited references. Nor does the Office action assert otherwise.

Claim 57 should be allowable for at least the foregoing reasons.

New claim 66 depends from claim 31 and, therefore, should be allowable for at least the same reasons as claim 31.

In the section of the Office action entitled, "Response to Arguments," the Examiner mentioned U.S. Patent No. 4,606,495 (Stewart) and JP 01-157768. Office action, page 9-10. The Applicant is not commenting on these references, or on the Examiner's interpretation of these references, because the Examiner has not used the references to reject any of the pending claims. If the Applicant has misunderstood the Action in this regard, it is regretted.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

A Petition for a Three-Month Extension of Time is enclosed. The required petition fee in the amount of $1,110.00 is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization.

Please apply any additional charges or credits to Deposit Account No. 06-1050, referencing Docket No. 09546-0027US1.

Respectfully submitted,

Date: December 7, 2010

William P. O'Sullivan
Reg. No. 59,005

Customer Number 26211
Fish & Richardson P.C.
Telephone: (212) 765-5070
Facsimile: (877) 769-7945

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